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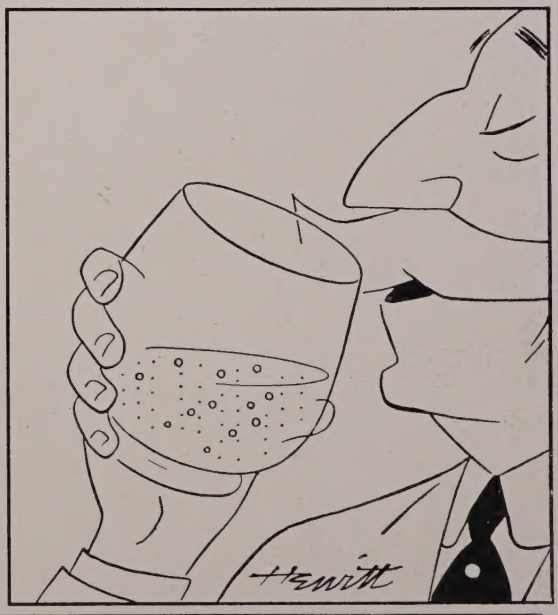


schweppervescence

lasts the whole drink through

Early Days in Bermuda and the Bahamas. I

by EDWARD LYNAM, D.Litt.

Our readers have often benefited from Dr Lynam's unique map-lore. Besides being Superintendent of the Map Room in the British Museum, he is President of the Hakluyt Society, which since 1847 has been publishing the original narratives of explorers of every part of the world in every age

A GROUP of coral limestone islets in the Atlantic Ocean, uninhabited and 3000 miles from Europe, the Bermudas were discovered by a Spaniard, Juan de Bermudez, about 1511, but never colonized. Their total area is only 19¼ square miles, and beyond their lovely wooded capes and limpid blue inlets perilous reefs foam on nearly every side. The English probably first knew them as a brilliant speck of colour in the ocean on Jean Rotz's great chart of the world, drawn for Henry VIII in 1542; but by 1596 Raleigh and the Elizabethan adventurers shunned them as "an habitation of the Diuell." Yet it was these dreaded shoals which gave Bermuda to England, and at the moment when English colonization overseas was beginning. The castaways from the *Sea Venture*, wrecked there in 1609, found themselves in an island Paradise; and before they sailed on for Virginia, Sir George Somers vowed that he would return and colonize the islands. He died soon afterwards, but the glowing descriptions of Bermuda which were soon circulated induced the Virginia Company to obtain a Royal patent to it as "a key to many parts of this new world."

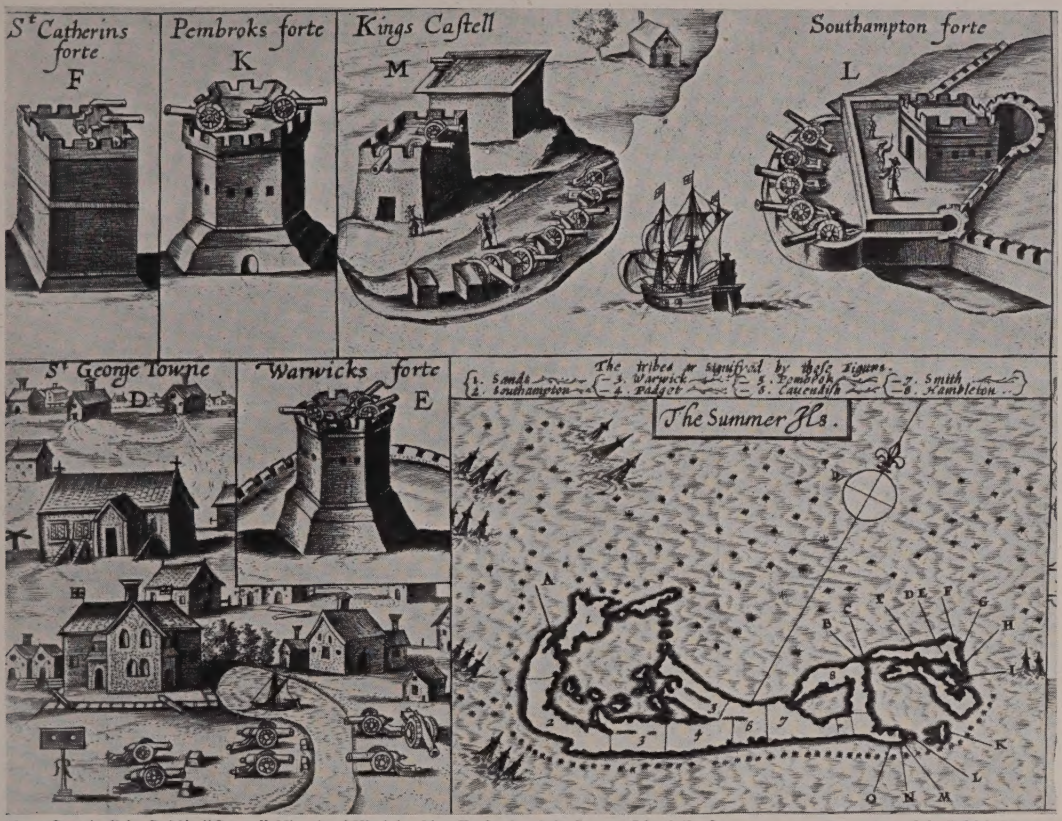
In July 1612 the first sixty colonists, with their Governor Richard Moore, a carpenter, landed at Smith's Island, and were soon building huts of cedar-wood and palmetto leaves at St George's, which was the capital for the next two centuries. For a time after 1614 life was idyllic. The domestic animals brought from England, as well as the figs, plantains, oranges and pineapples sent from the West Indies, throve amazingly; there was no native population to fight or impress; and as the Company's ships were often "well stufft with aqua vitae, rosa solis and good sack," in 1615 some of the leading men, old soldiers most of them, were keeping "revells and perpetuall Christmas" beneath a blazing sky! Rain, indeed, was their only water supply, as it is to this day, for Bermuda has no springs though many winter showers. In 1618 little Bermuda was able to send beef, pork, maize, potatoes and dried fish to the starving Virginians; and for the next fifty years she played her part in the development of an English Empire by periodically supplying farm produce and fish to New England, Barbados, New York, the Bahamas and South Carolina. Her sunny security was occasionally disturbed by rumours that the Spaniards, who repented of their neglect of Bermuda, meditated an attack, and several forts were built to defend St George's Harbour; but dread of its hidden reefs protected that tiny English outpost until the frontiers had advanced far beyond it.

In 1615 the Virginia Company was replaced by the Somer Islands Company, a title chosen both to honour Sir George Somers and to advertise Bermuda. Among its members were influential advocates of colonial expansion such as Robert Rich, Earl of Warwick, later Commonwealth Governor of All the Plantations. Keen capitalists, they soon concentrated upon growing tobacco. Smoking was becoming popular with all classes in England in spite of King James' invectives against it as "a vile and stinking custom," and in 1613-16 the Virginians had been saved from ruin by their tobacco crops. At first it grew successfully in Bermuda, the export to London in 1618 being 70,000 lbs at 2s. 6d. a lb, and considerably larger in the following years. It became not only the staple product of the islands but their currency. Thus in 1628 the wages of a master mason were 2 lbs of tobacco a day, of a minister 700 lbs a year, while in 1622 ten prospective wives were sent out, whom bachelor settlers bought at 150 lbs of tobacco apiece, to "their great contentment."

In 1617 Richard Norwood, who later became a famous mathematician and the first Englishman to find the length of a geographical mile, finished a survey and map of Bermuda for the Company. Apart from an area at the eastern end reserved for public expenses, the islands were divided into eight Tribes or parishes, each named after a principal Proprietor and each containing 50 shares

By courtesy of the British Museum

From a sea-chart of the world, 1542, beautifully drawn and coloured for Henry VIII by Jean Rotz, alias *John Ross, a Dieppe navigator of Scottish extraction whom Henry employed. This portion has never before been reproduced. The representation of "La Bermuda" (left centre), the Bahamas and the West Indies is remarkably correct*



From Captain John Smith's "Generall Historie of Virginia, New England and the Summer Islands," 1624. *By courtesy of the British Museum*

The Bermuda forts and St George's, about 1624. Nine forts were erected to defend St George's and Southampton harbours, 1613-29. When Spanish ships approached in 1614 the 'Castell' battery possessed three cannon-balls: but two scared them away. Note the stocks in the town of St George's

of 25 acres. The shares were allotted to Undertakers in London at £12 : 10s. apiece. Within five years of the survey every islet, dale and promontory, from Tucker's Town to Gates' Island, was settled, the population being about 1500. The majority were tenants or servants sent out by the Undertakers to work their shares as tobacco plantations. Among them were village labourers seeking security from the economic oppression of the landed gentry, Nonconformists who regarded the Established Church as little better than the Papacy, and men and women from the prisons of Newgate and Bridewell, supplied gratis by the City of London. A small upper class was composed of men who owned their own shares—relatives and friends of the Proprietors, veterans from the Elizabethan wars and a few of the earliest colonists. Their descendants have taken a leading part in Bermudian affairs ever since.

The Company at once began a ruthless exploitation of its property. It took half of all the tobacco grown by its tenants, ordering that all of it should be sent to London; it charged an impost as well as freight charges on every cargo, and did not pay the growers until after the sales; it levied heavy taxes for the administration of the island; and it ordered that no goods should be carried to or from Bermuda except in the Company's ships or by their permission. The islanders were forced to buy clothes, agricultural tools and other necessities from the Company's 'magazine' ships at exorbitant prices. Their isolation and their wrongs soon moulded them into a community, independent yet conservative, indolent yet adventurous. They did not hesitate to complain to the Company of "the excessive and gripeing prices of all necessaries", to describe their rule as an "anarchy of government" and to declare "the merchants' slaves wee will not bee". Yet the records show that crime was almost unknown among them. During the first fifty years, at the end of which the population was about 8000, their chief failings were drunkenness, petty larceny, 'incontinency', swearing and seditious language, in that order. Their General Assembly or parliament, in which there were two representatives from each Tribe, managed domestic affairs, with which

Richard Norwood's map of Bermuda, surveyed in 1613-17 and published in John Speed's Prospect of the—

By courtesy of the British Museum

-Most Famous Parts of the World, *1627*. *A list of the shareholders, with details of shares, was printed below*

alone it had power to deal, wisely and tactfully; and it kept a spirit of watchful resistance to the Company very much alive.

The Bermudians naturally began to evade the Company's restrictions in every possible way; and they soon discovered the opportunities of their situation. About these they received exciting suggestions from Captain Daniel Elfrith, part-time privateer in the West Indies for the Earl of Warwick, part-time resident in Bermuda. By 1630 many of the more venturesome were planning to emigrate. Bermudian tobacco was bringing in scarcely any profit, for its quality was poor and it was beginning to exhaust the shallow island soil; many planters were in debt to the Company, which treated them very harshly; many others lacked all the essentials of civilization except food and good health. From 1630 to 1700 the Bermudians were pioneers of the 'Western Design' which Warwick and Pym had formulated and Cromwell later adopted; and their courage, experience and ability greatly strengthened the new English settlements in Barbados, Tobago, Trinidad, Honduras, Jamaica, South Carolina and, more especially, the Bahamas, of which more anon.

By 1677 the Somer Islands Company—now reduced to eighteen members, all of them insignificant persons—realized that the fabled riches of Bermuda 'were only skin deep'. With the heavy fall in profits so many shares had been alienated that the islanders possessed seven-eighths of Bermuda, and were openly violating all the Company's regulations. In 1684 the Company was abolished and the islands came under the Crown, the first Royal Governor arriving in 1687. Most of the Governors of the next century had more influence in England than capacity for their post, but the Bermudians either guided them tactfully or resisted them stubbornly. They had more pressing problems than the foibles of Governors. The cultivation of tobacco was abandoned, very wisely, after 1707. Attempts made by the Company to produce olive oil, castor oil and sugar for export had all failed, partly because of the small area of cultivable soil in Bermuda, partly because cedar-wood was the only available fuel for the sugar boilers. More serious, the export of provisions to the North American colonies, which in 1677 brought in some £6000 yearly, had ceased because the islanders had no food to spare. The climate of Bermuda, unlike that of the West Indies, is quite suitable for European labour. But the colonists had always despised work in the fields, and after 1670 they employed many negro slaves on it. As a result, the coloured population of Bermuda is now larger than the white. The colonists preferred to seek a livelihood on the sea. For some years they had been building sloops with their own cedar-wood, and had become skilled navigators. Fortune favoured them. About 1678 they discovered large quantities of salt in the marshes on Turks Islands in the Bahamas, some 750 miles to the south, and promptly established a busy industry there, which eventually employed one-tenth of their people, including slaves. For a century they supplied salt to the North American ports, each salt-ship sailing some 3000 miles every year and bringing home provisions and manufactured goods. They developed the famous Bermuda rig on their ships, they extended their voyages, until, as Burke observed, seafaring was their "only business". During the 18th century Bermudian ships were the successors of the Dutch as the principal carriers in the Atlantic, and were familiar sights in every harbour from Halifax to Charleston. Bishop Berkeley called the Bermudians in 1725 "the only people of all the British Plantations who hold a general correspondence with the rest"; and some of them were at Ascension Island when Cook passed there in 1775.

Privateering was an occupation which the Bermudians pursued with zest during the wars with France, 1756-1815. They did not always remember to confine their attentions to French ships, while wrecks on the reefs of Bermuda were strangely frequent in that period. Shipowners became wealthy in the 18th century, and many handsome houses were built in the colonial style of architecture. The native coral limestone, which is so soft that it can be cut with a heavy saw, began to supersede wood as building material about 1700. It is used for roofing as well as for walls, for it becomes very hard in the open air. Yet in spite of all these activities, to which whaling was added after 1738, the Bermudians had to import most of their food from the American colonies by 1750. The American War of Independence, which stopped the traffic in salt and the supply of provisions bought with salt, raised a delicate problem. The islanders had many near relatives among the insurgents and considerable sympathy with them, which was increased by the oppressive rule of their own Governor, G. J. Bruere. Finally they wrote to General Washington explaining their difficulties. He replied in most friendly terms, and mentioned that he also suffered from a shortage of gunpowder. Soon afterwards a hundred bar-

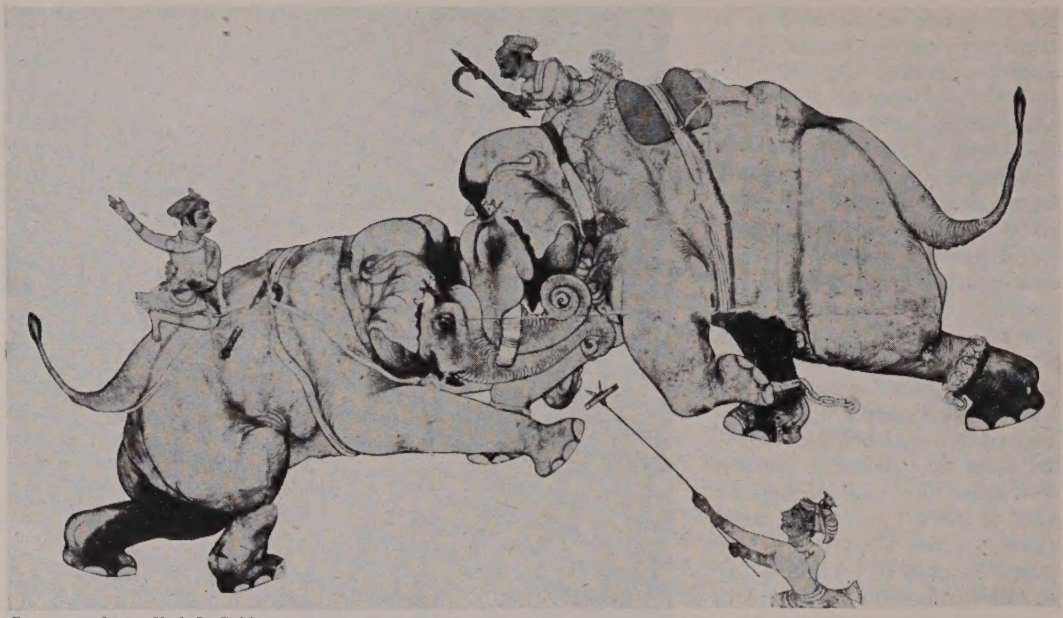
rels of gunpowder stored at St George's vanished mysteriously and reappeared at Philadelphia, while several American ships laden with food found their way to Bermuda.

The islanders went through hard times during the next sixty years, for though they numbered some 12,000 their salt industry was ruined when the English Government granted Turks Islands to the Bahamas, and their sole exports with which to purchase necessities from abroad were small quantities of onions, oranges, early potatoes and palmetto baskets and hats. The Anglo-American war of 1812-15 brought some relief, for the West Indies sent many cargoes of their produce to Bermuda, whence it was smuggled out to waiting American ships and sold at a handsome profit. In 1815 Hamilton replaced St George's as the official capital. Two wars with America had taught the British Government that remote Bermuda had its uses, and between 1810 and 1863 a great naval base was built on Ireland Island. It disturbed the ancient peace of the islands, but the inhabitants welcomed it for the money it brought. Indeed by 1850 it was abundantly clear that little Bermuda could never be a self-supporting colony, that her earlier existence as one was in the nature of an economic puzzle, and that her future function must be to serve the great nations on either side of the Atlantic. The American Civil War found her fulfilling that function. The Confederates needed many things, but especially war material, from England. England needed cotton from the South. Bermuda could supply both, at a price. For five years the islanders lived as they had never lived before; ships came and went all day and all night; the docks at St George's were thronged; wads of banknotes filled every pocket and the bars seldom closed. Then it was all over. Quiet and sunlit poverty returned.

Literature and warfare saved the islands from starvation or depopulation. In the 19th century a succession of poets, essayists, novelists—Tom Moore, Trollope, Frances Hodgson Burnett, William Dean Howells, Mark Twain, Kipling—fell in love with Bermuda, as who would not who ever stayed there, and in their writings they proclaimed her myriad charms. Since about 1880 American tourists have come to Bermuda in ever-increasing numbers. White villas belonging to wealthy Americans crowd the islands, and their yachts lend winged grace to every view. The "key to the New World" has become its playground, though a Bermudian law has decreed that almost all the land must remain the property of the natives. The "habitation of the Devil", too, has become a centre of forces potentially more destructive than any that the Elizabethans could imagine, for Bermuda is now a naval and air base equipped and held by Great Britain, the United States and Canada. Yet through all their vicissitudes the descendants of the original settlers have remained as independent, and in some ways as conservative, as ever, still forming, in their character and loyalties, an outpost of England.

After Van Dyck

Robert Rich, Earl of Warwick: Governor of the Somer Islands Company, West Indian privateer, Puritan, and leader of English colonial expansion in the Americas during the 17th century



By courtesy of Mrs. K. de B. Codrington

The elephant fight: a sport of princes. Brush drawing on paper. Bundi, Rajputana, 18th century

Animals in Art

VIII. Indian : Part II

by K. de B. CODRINGTON

ISLAM is, of course, a world religion, but few people realize how wide an area of the globe it covers, from China to the Atlantic coast of Africa. When the Prophet died in A.D. 632, it was still confined to Arabia, but within a few years Muslim armies had carried the banners of the Faith through Syria, Babylonia and Egypt, westward across Africa to Spain, and eastward to the cities of Central Asia, Samarkand and Bokhara, and to India. The conquest of Sind in A.D. 712 was more than a mere military reconnaissance, as some writers would have it. The ancient Indian city of Brahmanabad, "the city of the Brahmans", was sacked and Multan, the commercial heart of western India, became a Muslim, that is to say a foreign, capital.

But it was not till the end of the 10th century that Mahmud of Ghazni began his series of invasions, which eventually brought all India under Muslim rule. The story is not one of bigotry, pillage and murder only. Islam, born of the primitive complexity of the Arabian desert, was from the beginning in touch with the Roman Empire, that is to say, Byzantium, on one side, and with the Persian Empire on the other. Constantinople survived the shock of the attack. Persia fell, but compensated for its military and political defeat by cultural victory. Persian civil servants and Persian writers, artists and craftsmen lived to mould the future of the Caliphate, breathing into what was strictly a religious office the Persian tradition of royal magnificence which lay behind the ancient title "King of Kings". The result was that in a few generations Islam, abandoning the tent, the camel-saddle and the Holy Places of the desert, established capitals at Damascus and Baghdad on a scale of wealth and luxury that the European West has never known.

India has been invaded many times but has always been able to absorb and eventually dominate its conquerors. Western civilization brought a foreign tongue to India; so did Islam, but with this difference, that whereas

the language of Western commerce and administration remained severely practical, the language of Islam touched other matters of common interest. Persia and India were old neighbours, and Persianized Islam had much to offer, especially in its appreciation of poetry and art. It is only today after three whole centuries of sustained contacts that the West is learning to appreciate Oriental art. It is true that in Muslim eyes the Hindus were idolaters and unbelievers, and that the result of the conflict was often bloody. Yet even today, when Islamic India has chosen to divide itself from Hindu India and the political situation has given birth to extremist views, it is clear that Islam is nearer to India than to the West, and that they share many traditions drawn from their common ancient Asian origins. The spirit, by which all religions live, draws its sustenance from many sources. Hinduism is a synthesis of widely varying elements. It embraces Earth-worship and Sun-worship, the cult of the family, and the acknowledgement of the cyclic pattern of life as well as of its unchanging truths. Trees, flowers, birds, and beasts all find a place within its wide scope and are treated of with rare sympathy. This sympathy for the dumb creation, full of pathos yet not without humour, is, perhaps, the reason why the world has taken the old Indian animal-stories to its heart, so that everybody knows Æsop, though few remember his stories are Indian. It is certainly the chief inspiration of ancient Indian sculpture.

Islam, coming into being as the reaction to a decadent and senseless paganism, acknowledges only the One God and He is a jealous God. The traditions of the Faith make it plain that art, that is to say the creation of images, is sinful. The Quran says: "Oh believer, wine and games of chance and statues and fortune-telling are an abomination of Satan's handiwork"; and this is amplified by the traditions. The Arabic word for "painter" has the wider meaning of "fashioner", "creator", and it is said that painters will be among those who will be most severely punished on the Judgement Day, for they usurp the functions of God in daring to make forms. However, art existed and when the Baghdad Caliphate blossomed in all its glory it found a place for art of all kinds.

Very little early Islamic art has survived, but the Islamic sense of history has preserved records of many works of art. We read of garden carpets and animal carpets, especially of those adorned with the old Western Asian motive of the lion killing a deer. Hunting-scenes of all kinds were popular. A tent is described as being decorated with figures of all the animals of the world. The 13th-century palace at Konia in Anatolia was decorated with antelopes, elephants, unicorns, and phœnixes. Of all this splendour only a few ivory caskets and carved crystals remain, as well as the ruins of the 8th-century Umaiyad palace at Qusair 'Amra and the courtyard of the palace of Alhambra with its twelve magnificent lions. It is, however, evident how important animal motives already were in Islamic art.

All this painting and sculpture existed in the face of the disapproval of the learned leaders of the Faith. Its existence was not merely due to a breach of the law but sprang

By courtesy of the Indian Museum, Calcutta

A camel, delineated with sympathy and realism. Detail from a miniature painting of the Emperor Akbar's reign (1556-1605)

Akbar hunting. The game is driven by a circle of beaters into a ring-fence in the middle of which is the royal hunting pavilion. Two hunting leopards (cheetahs) are seen; one is held in leash, the other has just seized a male blackbuck, in front of which the female blackbucks flee in terror. The game also includes spotted deer, wild dogs, foxes, hares and (above, to the right of the mounted Emperor) Himalayan sheep and goats

By courtesy of the Victoria & Albert Museum

Illustration from the Iyar-i-Danish *("Touchstone of Wisdom"), a collection of fables written by Abu'l Fazl, Akbar's minister and author of the official chronicle of his reign. It shows King Solomon on his throne talking with the birds and beasts, among which are a lion (then common in India but now very rare) and, below, a pair of blackbuck, the male with undulating horns. By the Hindu court artist, Shankar Gujarati*

By courtesy of A. Chester Beatty, Esq.

By courtesy of His Majesty's Government in the United Kingdom

A hunter under a plane tree with squirrels playing in the branches. A group of wild goats (ibex) reposes in the distance. Painted for the Emperor Jahangir (1605-1627)

From the same book as the picture on page 211 (the Iyar-i-Danish *by Abu'l Fazl), comes a page linking the elegant manuscript in Persian, language of the Mughal court, with a scene that recalls many subjects in Indian sculpture. These fables are in the direct line of descent from the old Indian Buddhist Birth Stories. Aesop's Fables and most of the animal stories of our children's books originate from the same source*

By courtesy of Sir Cowasji Jehangir, Bart., Bombay

from the living fountain of the spirit of Islam to which the lawyers were, as usually happens, blind. Sir Muhammad Iqbal has pointed out that, whereas Platonic idealism dominated the West, Islam never turned away from Aristotle to lose itself in the abstract. Life was not only real, but was, as the creation of God the Most High, a single thing. Man stands at the head of living things but is not separated from them. It is written in the Quran: "See you how God hath put under you all that is in the Heaven and all that is on the earth. . . . He hath subjected to you the night and the day, the sun and the moon and the stars. . . . Verily in this there are signs for those who understand. . . . He sendeth down rain from Heaven and bringeth forth by it the green leaves, the palm-tree, the date, the olive, the vine and the pomegranate. Look you on their fruits. . . ."

To the Platonist only man is the proper study of man. The Quran is perpetually returning to the gift of sight and the splendour of created things. In doing so it comes very near to the Indian sympathy with nature.

Art is largely a matter of tradition and it is not surprising that early Muslim painted manuscripts display the mannerisms and technique of Byzantine painting. Fresco-painting seems to have been largely used, but only fragments remain, and very few early manuscripts have survived. In the 13th century Baghdad and the Caliphate fell before the Mongol hordes, but by then the Islamic tradition was strong enough to tame the barbarian. Islam survived and Islamic art received a new flow of fertilizing influences from China. Literary references make it plain that among all the rarities from China, including its fine porcelains, it was Chinese painting that especially struck the Muslim connoisseurs. Painting in tempera colours and gold on prepared paper became the rage at Muslim courts. Artists were acclaimed as

By courtesy of Bharat Kala Bhavan, Benares

A late 17th-century painting from Rajputana illustrating one of the modes or keys of Indian classical music: an essentially Hindu theme, in which animals play their part. This picture and the one opposite show the comprehensive spirit of the Mughal school, despite its Muslim derivation

masters and began to sign their paintings and even princes dabbled in the art. It was this courtly art, developed under Chinese influence, that the Mughal emperors took with them to India. Originally an art of book illustration, the Islamic sense of history applied it to the chronicles of the past and the records of the present. Interest in current events and the personalities of the court of the patron prince brought portraiture to the fore, which was especially developed in Mughal painting.

The old Islamic interest in animals still survived, inspired by a new sense of realism. This is especially noticeable in the animal paintings. The illustration on page 208 shows an elephant fight, a courtly sport which survived until recently at certain Rajput courts and of which we have many descriptions from the pens of early travellers. But it is the elephants themselves that hold the eye: the vision is native and carries one back to the elephants of Bharhut. The camel on page 209 is equally convincing. Camels have always been used for special messengers in India and the artist has seized upon the sense of speed these great beasts have in spite of their gait. Hunting-scenes are equally common. The scene on page 210 is typical of the paintings which illustrate events of the Emperor Akbar's reign. The main subject records a great hunt held by the Emperor, of the kind where game of all kinds is driven into a fenced arena in the centre of which is the royal hunting-pavilion. But in the top right-hand corner a contemporary political event is recorded, the punishment of Hamid of Bakkar, who is shown being driven around the camp seated backwards on a donkey. The succeeding picture is an epitome of these animal-paintings. It shows King Solomon holding court before the birds and animals of the world, who brought him information from the ends of the earth.

Hunting-scenes, though prominent in these paintings, do not dominate the range of subjects. Many animal subjects are painted for their own interest. Of these genre pictures

Such paintings are closely related to the seasons, for certain musical modes are only played at certain times of the year. That here depicted belongs to the season when the rains begin. The sky is thundery and the peacocks cry. Painted by an artist of the Jaipur school of the 18th century, on a theme particularly popular at the Rajput courts, this picture interprets a text written in Hindi and in the Hindu Nagari script: compare that on page 213

By courtesy of His Majesty's Government in the United Kingdom

By courtesy of the Municipal Museum, Ahmadabad

A Rajput Prince boar-hunting: a typical example of a late painting, probably early 19th century. The background is filled with shrubs and flowering plants, formally treated in the Chinese manner

that on page 212 is a magnificent example. The plane tree is not native to peninsular India. It grows in Kashmir and Kabul and, indeed, was probably originally imported from Persia. Here the autumn foliage among which the squirrels play makes a lovely frame for the mountain landscape beyond, with its wild goats. On page 213 is a painting reminiscent of many monkey-subjects in Indian sculpture. It illustrates an old fable, but the realism of the drawing of the tree and the clouds is typical of Mughal painting. The sky owes something to Western art, for the Jesuits had made European paintings familiar at the Mughal court. The next two pictures show the wi lth of sympathy of this Muslim school of painting for they illustrate the traditional modes or keys of Indian classical music and as such are essentially Hindu. The Jesuits' Christian paintings were also copied, though these Western copies always show a certain uneasy stiffness, the antithesis of the easy freedom of the Indian subjects.

Like Italian Renaissance art, Mughal painting was born of princely patronage. The personality of the patron is everywhere evident. It begins with Akbar, the soldier-politician who dreamed of a new religion that would unite Hindu and Muslim. It perhaps reached its zenith under Jahangir, the poet-naturalist, who allowed his power to slip from him. Jahangir was, by the letter of the law, a bad Muslim. He drank wine and loved painting. But his journal is full of records of the birds and beasts and flowers he had seen. He had the seeing eye and a love of natural beauty that is strange in an Emperor. He bred the wild Markhor goat in captivity and Barbary sheep; and the rare Abyssinian zebra and the turkey-cock he received as royal presents are both preserved for us to see by his court-painters. The floral borders and backgrounds of later Mughal paintings are also born of his taste. In all this natural beauty, he found those signs for the true believer of which the Quran speaks.

The Yellow River: China's Sorrow?

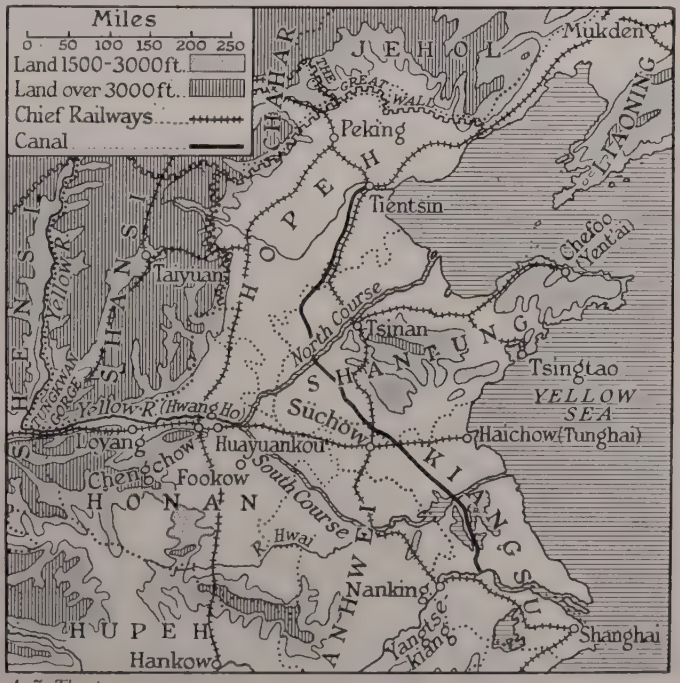
by SIR JOHN PRATT, K.B.E., C.M.G.

Sir John Pratt, who is the author of various works on China and the Far East, including War and Politics in China, *was the chief adviser to the Foreign Office on Chinese affairs from 1925-1938 and has held many consular posts in China, where he took up his first appointment fifty years ago*

Four of the great rivers of Asia rise very near each other in the huge and forbidding plateau of Tibet, some 17,000 feet above the sea; two of them, the Mekong and the Salween, cross the province of Yunnan in the south-west corner of China and flow into the sea through south-east Asia; the other two, the Yangtse and the Yellow River (Hwang Ho), flow through the heart of China to the Pacific Ocean.

No two rivers in the world could be more unlike than the "tamed and genial Yangtse", navigable for ocean steamers as far as Hankow, 600 miles from the sea, a great artery for the commerce of 180,000,000 people, and the Yellow River—"China's Sorrow"—an obstacle and not an aid to commerce, liable at any moment to break loose and spread destruction far and wide. Nevertheless it is to the Yellow River, and not the Yangtse, that China owes her existence and many of the essential characteristics of her civilization.

Chinese civilization was not imported from the West but had its origin, and has continued to flourish, in the great North China plain across which the Yellow River flows. Some Western writers have believed that the Yellow River basin was once a watery chaos of bush- and jungle-covered swamp. Arnold Toynbee has a theory that civilization needs this kind of "stimulus of hard environments"; but, in fact, civilization began on the North China plain because the loess soil was favourable to early cultivation. The Chinese crossed the Great Divide between barbarism and civilization when they first put seeds into this fertile loess soil and waited for a crop to grow. They did not have to drain marshes or hew down forests or hack their way through jungle; nor were they hampered, as were the people in Europe, by large survivals of forest folk who knew no other way of life but hunting. The land was already prepared for cultivation by the Yellow River. The whole of the North China plain from the Great Wall to the River Hwai and from the line of the Peking-Hankow railway to the Yellow Sea has been built up out of the sediment collected by the Yellow River as it roars down from the mountains of Tibet through the loess highlands of the north-west. At some not too distant period in the past, as geologists reckon time, its mouth was at the Tungkwan gorge, west of Loyang; and as in the course of ages it filled up the Yellow Sea it wandered at will all over the plain it had created.



A. J. Thornton

ese Government Information Office

On the great North China plain, when the Yellow River overflows its banks and the rising waters threaten farm buildings, dykes are thrown up to prevent the drowning of still more fertile land

In the course of its wanderings the Yellow River deposited a broad belt of loess across the centre of the plain, from the plateau in the west to the mountainous area of Shantung, and it is the peculiar properties of the loess that made this region essentially favourable to early cultivation. Loess soil is not only very fertile, but the same crops can be grown on it year after year for centuries without its becoming exhausted. Owing, it is believed, to some kind of capillary action between its particles, its fertility is renewed whenever a new surface is exposed by wind or water or by the agency of man. The farmer in North China, as elsewhere, is dependent on rainfall for good crops and, owing to progressive desiccation in recent centuries, droughts and famines have become more frequent. The greatest danger, however, is not drought, but flood. The river carries so much silt that its bed continually rises until it is above the level of the land on either side. There is thus an ever-present danger that it may break through the defences and seek a new course along lower ground. For the last 500 miles of its course across the plain, from the western plateau to the sea, the Yellow River receives no tributaries, there are no cities along its banks and it carries practically no traffic. But the North China plain is not always a land of flood and famine. The floods that have wrought so much destruction have also created the broad and fertile fields which for thirty or forty centuries have been the home of an industrious and highly civilized people. The social order never crystallized, as in ancient Greece, into tiny warring city-states. Life is maintained by a system of intensive agriculture based upon water control. The people live dispersed in tiny hamlets all over the plain (one is never out of sight of two or three of these villages); and the tradition of co-operative labour, intelligently directed over wide areas for the welfare of the whole people, was established at a very early stage. Civilized existence based, not upon slavery,

but upon co-operation for the common good, thus became possible, and it is these early traditions that gave Chinese civilization the essential character it has borne through all succeeding ages.

One of the most famous of the Legendary Rulers of China is the Great Yü, who flourished at the end of the third millennium B.C., and who, after nine years of incessant toil, succeeded in drawing off the waters that had drowned the land. This tradition preserves the memory of early Yellow River floods and the methods, handed on from generation to generation, for confining the river within its banks. The traditional Chinese method is to build restraining dykes—in addition to the defences along the banks—at a distance of about a mile from the river on either side. Then when the water rises it floods between the dykes but no farther, and as the floods subside the river gradually returns to its former channel. It is essential, however, that the farmers should be restrained from occupying and cultivating the land within the dykes, for the passage of farm carts and other traffic would soon wear down the dykes and make them useless. The sight of fertile land unused is a strong temptation, especially in a region so densely populated as North China, and such measures can only be enforced by an honest and efficient administration. When dynasties are decaying and the country is afflicted with banditry and rebellion, these precautions are neglected, the dykes are not repaired and disastrous floods occur. A Chinese map, published at the beginning of the 18th century in Peking, shows a score or more of different courses which the river has taken since the great flood of 2297 B.C. Some are north and some are south of the Shantung promontory. In the 7th century B.C. its mouth was somewhere near Tientsin, and the numerous muddy rivers in that region are the legacy it left behind when it moved off farther south. During the Sung dynasty, up to A.D. 1194, it was flowing so far south that its debris choked the River Hwai, which has never since succeeded in finding an outlet to the sea. In 1851 the mouth of the Yellow River was south of Shantung at a place about midway between Tsingtao and Shanghai. In that year it changed its course and, after one of the most disastrous floods in history, it found a new outlet north of the Shantung promontory. It was no mere coincidence that this great disaster occurred at the beginning of the Taiping Rebellion, which raged for fifteen years and laid waste twelve of the eighteen provinces of China. The traditional methods of control were brought into operation again; the people continued to suffer from the usual cycle of floods, droughts, and plagues of locusts, with possibly three good harvests out of ten, but the Yellow River did not actually break loose again until the dykes were deliberately

A well, long buried under many feet of Yellow River silt. In the background are two of the famous Shantung wheelbarrows, used throughout North China for carrying goods and passengers

All photographs, except two, from Rex Feat

In North China locusts may destroy more food than floods or drought. Refugees from the Yellow River floods of 1938, returning to their homes, were rewarded for each catty (1⅓ lbs) of locusts they collected with two catties of flour. In a single day 30,000 catties of locusts were thus collected, weighed and buried. (Above) *One old peasant couple who, at any rate, thoroughly enjoyed the sport*

When the floods subsided, the peasants who had fled from their farms nine years before came flocking back at the rate of 2000 a day. (Above) *Cultivating newly-recovered soil with a man-drawn plough: typical of a land where human labour can be mobilized on a scale undreamed-of in any other country.* (Right) *Camps were prepared where food and shelter could be found by the returning refugees*

Chinese Government Information Office

With plenty of women and children, all in high good humour and quite uninterested in politics, a crowd of farmers and their families assails one of the centres where food was given to refugees

destroyed in 1938 as a measure of defence against the Japanese.

It seems probable that the general who blew up the dyke at Huayuankou on June 15, 1938, intended only to produce a local flood in order to stop a Japanese force advancing on Chengchow, an important railway junction on the Peking-Hankow railway. There are no limits, however, to the irresponsible folly of which Chinese military commanders are capable. The whole of the Yellow River poured in an irresistible flood through the gap; the old bed north of the Shantung promontory dried up; and for the next nine years some 3,000,000 acres of fertile land in the provinces of Honan, Anhwei, and Kiangsu were drowned under a sheet of muddy water. Four hundred thousand people lost their lives and one million people fled for refuge to the cities on the Yangtse or to the high ground in the loess plateau.

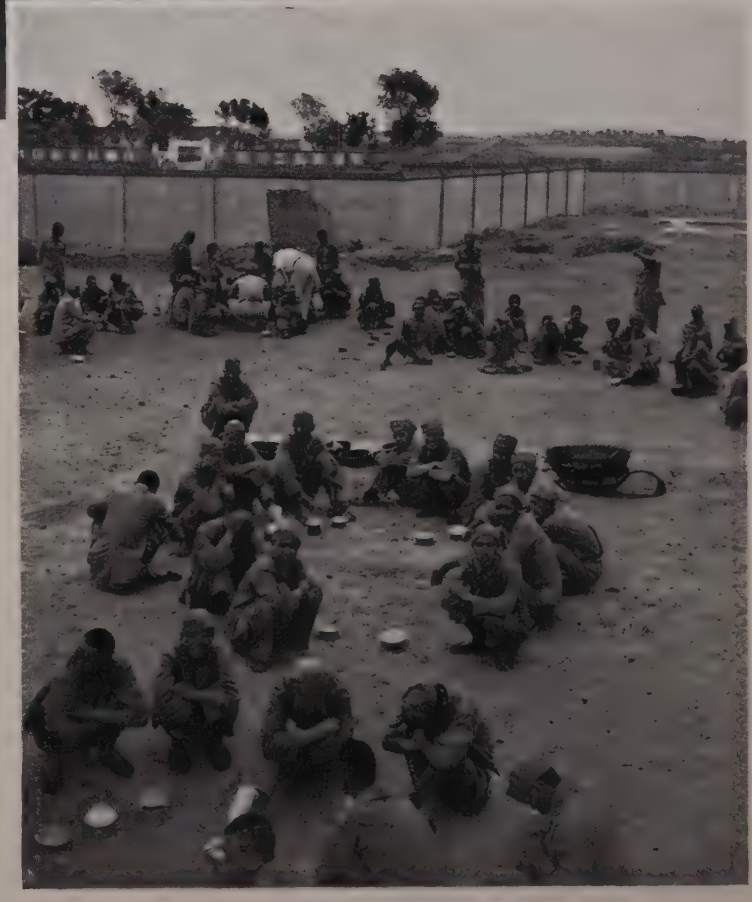
When Japan surrendered, in August 1945, much the biggest task awaiting UNRRA was the rehabilitation of the North China plain. UNRRA had to work through CNRRA (the Chinese National Relief and Rehabilitation Administration), which the Chinese Government had established in the previous January as a Department of the Executive Yuan; and progress was impeded partly by the corruption and inefficiency of which so much has recently been heard, but even more by the civil strife which has been endemic for more than thirty years and still shows no sign of abating. It was decided, on the expert advice of American engineers, to close the breach at Huayuankou, now nearly a mile wide, and divert the river back to its old course north of the Shantung promontory; but since 1938 some 160,000 settlers had been attracted to

Unloading flour at the UNRRA warehouse, Fookow. In February 1947, just before the closing of the breach at Huayuankou, 2200 tons of supplies were sent for distribution in the flooded areas

the fertile land in and along the old bed of the river, and the whole system of inner and outer dykes had largely crumbled away. It was obviously necessary that these settlers should be moved and compensated and the old dyke system repaired at the same time as the breach at Huayuankou was being closed, but the difficulty was that most of the old bed ran through country that was under Communist control.

Throughout 1946, while attempts were being made by means of negotiations at a high level to bring about a settlement between the Communists and the Kuomintang, political conditions in the North China plain remained chaotic. "The entire area", says one report, "was militarily fluid, filled with roving bands of Communist and Nationalist soldiers and marauding non-partisan bandits"; and, as the Kuomintang called the Communists bandits and the bandits called themselves Communists, it is perhaps not surprising that recriminations flew thick and fast. The Kuomintang declared that the Communists did not want the river back, because it would cut their base in half, and accused them of interfering with the work at Huayuankou. The Communists, on the other hand, declared that the repair works on the old dykes had been deliberately delayed because the Kuomintang was plotting to march into the liberated areas in the wake of devastating floods. In fact, what appears to have happened is that, in the face of tremendous difficulties, the two sides succeeded in reaching agreement, the dykes were repaired, the gap was closed, the river was successfully diverted and began flowing down the old course on March 15, 1947; and it is interesting to note that in the end the methods that

(Left) *Nationalist (Kuomintang) soldiers on duty as a road patrol six miles from Fookow. At one stage of the proceedings Fookow fell into the hands of the Communists but UNRRA workers were allowed to go forward at their own risk. They found that the Communists had remained in occupation of the town for two hours and had then departed, taking with them as prisoners thirty-six policemen*



(Right) *A concentration camp in Honan for Communists captured by the Nationalists. The prisoners are certainly not cramped for room and the photograph affords no evidence that they are not well treated. Actually they are reported to be suffering greatly from neglect. There is no medical attention even for those who have been wounded and the food, which consists of boiled rice and water, is far from sufficient*

proved most effective were the traditional methods that have been employed since the Great Yü controlled the floods in the third millennium B.C.: bundles of rocks and stones in bolster-shaped willow-branch baskets proved more effective material for dams than any that American engineering science could provide.

The refugees who fled in 1938 are returning to their homes, and foreign observers have described the uncanny way they go straight to a piece of land which they declare is theirs, dig down through the silt and uncover a well, or buried household goods that they had been unable to take away; but whether the peasants and farmers in the Communist areas are faring so well is doubtful. In spite of the agreement signed in Nanking last October providing that in the distribution of these supplies there was to be no discrimination in race, creed or political belief, the charge is freely made that UNRRA supplies have been withheld and that UNRRA represents "another instrument of American foreign policy which has armed, transported, and still is training Kuomintang armies to fight the Communists."

UNRRA representatives deserve great credit for bringing about co-operation between Nationalists and Communists. Here one of them discusses a tractor project with a Communist official

The river has returned to its former bed, but only constant vigilance and continuous co-operation can avert fresh disasters. At the suggestion of the American Director of UNRRA China Office, a Joint Committee of Kuomintang, Communist and UNRRA representatives has been set up, but the charges and countercharges still continue and there are gloomy prophecies of fresh floods that will threaten Tientsin. Nevertheless, there are grounds for hoping that, in this crisis of China's civilization, the Yellow River may once again play its ancient role of persuading men to live together in harmony and good order. CNRRA has been the object of much adverse criticism, but there is another side to this picture also. The CNRRA working teams, aided by foreigners, went into the villages as they were being built and helped to raise the standard of hygiene and to set up schools, clinics, and orphanages. The teams were composed of young Chinese ex-students, many of whom had served in the war on the Burma and other fronts. "They were extremely enthusiastic in their work. They saw it as an opportunity to aid in the building of a new China that would be an example to the rest of the country. They lived a life of hard work without any relaxation and were faithful followers of the foreigners working with them, realizing that from them the Chinese could learn a new and perhaps better way of living. They were an example to the returning farmers and demonstrated that, given the chance, there were Chinese who could organize themselves to obtain from the soil a higher standard of life and who were willing to use all their resources to help others." This description of the CNRRA teams by one who worked with them justifies the belief that Confucian civilization is still a living force today and that it will not succumb to the twin evils of nationalism and militarism that are destroying the Kuomintang.

Scotland in the Antipodes

by DARRY McCARTHY

Otago, the most southern province of the Dominion of New Zealand, this year celebrates the first centenary of her foundation and looks back, with justifiable pride, on a hundred years of achievement.

The rain-swept hills and the long glaciated harbours of Otago, her beautiful lakes and the poor quality of much of her pastures, make it easy to draw a comparison with Scotland, the home of most of Otago's early immigrants. This year, with a swirl of bagpipes and the restrained exuberance of a Caledonian populace, Dunedin paused in her labours to examine her history and to commemorate, for a space, the dogged courage of the few hundred who, three months out from the Clyde, looked from their ships towards the bush-clad site of their village, tentatively named New Edinburgh. The cluster of rough wooden houses, incongruously furnished with heavy old fittings brought from Scotland, was soon called Dunedin, the ancient Gaelic name for Edinburgh.

A. J. Thornton

The Rev. Thomas Burns, nephew of the poet, led the migrants, Free Kirk dissenters who had left home, as the Mayflower Pilgrims had done, because their rigid doctrines and uncompromising severity of outlook made them unpopular. Rather than risk contamination of their beliefs, they sought Utopia in a singularly unpromising new Scotland.

Today, Otago exports wool, meat, grain, fruit, milk and cheese. Dunedin is an industrial city of ever-expanding wealth and importance, manufacturing rugs, blankets, woollen clothing, biscuits and chocolates. Small ships are built at her port, and her farm machinery is in demand in several overseas countries. There are a number of tanneries; and factories for making jam and preserves, cheese and condensed milk send a welcome stream of food to the United Kingdom.

Dunedin, architecturally, is a planned city, as the aerial photograph of the Octagon on page 228 shows vividly. The city buildings, grey, stolid, designed to endure, seem older than their average fifty years. (The earlier wooden single-storied structures lasted but a generation or two.) Only graceful First Church, one or two other churches and the ever-visible moulded green hills, prevent a feeling of monotony in the minds of visitors from the rest of New Zealand, for they are used to a variety of colours and designs, individuality run riot in a multitude of conflicting styles and painted tin roof-tops.

For many years after its foundation, Otago's destiny was controlled by the canny leaders chosen by the first immigrants. These men coupled their religious zeal with an equal determination to prosper materially and to bequeath to their descendants a province economically balanced and financially secure. In the early years there were numerous hardships, particularly for the women trying to make their rough shelters more than merely habitable. Patiently, step by step, the Scottish migrants smoothed the rough edges and hewed their way to civilization.

There were no Maori wars in Otago, where the natives, preferring a warmer climate, were few in number; but the original nucleus of settlers in Otago had a particular cross to

First Church, a prominent landmark of Dunedin (Otago's largest city), is considered one of the best examples of Gothic architecture south of the Equator. Otago (southernmost province of New Zealand) was founded by Scottish Free Kirk dissenters, and its history has several features in common with that of the early New England colonies, including religious zeal and a strong desire for material prosperity

Descendants of the original settlers dressed in Victorian clothes to re-enact the first landing. The scene here shown was part of a Dunedin tableau held to celebrate the centenary of the foundation of Otago in 1848

All photographs, except one, by V. C. Browne

(Above) *An aerial view of Port Chalmers (eight miles north-east of Dunedin), principal port of Otago, which exports meat, wool, cereals, cheese and fruit to the United Kingdom. The soft rounded hills are typical of the east coast of most of New Zealand, while Otago's south-west coast resembles the Scottish Highland sea-lochs.* (Left) *The streets of the Octagon, centre of Dunedin's cultural and commercial life, are named after Edinburgh's main streets*

By courtesy of the High Commissioner for New Zealand in the U.K.

(Above) *A New Zealand ex-soldier pauses during mustering to admire his farm, purchased with the help of a rehabilitation loan. By recent legislation the government is empowered to buy large estates and divide them into "Economic Units" for ex-servicemen. Many of these favour Central Otago* (right), *as its extensive new irrigation schemes provide insurance against drought. Lombardy poplars, early introduced from England, are today widespread in this area*

bear in a sudden influx of adventurers when gold was discovered in Gabriel's Gully in 1861. Men poured in from California, Australia, and the rest of New Zealand; the sober citizens of the province were also affected and walked out of their niches so quickly that entire streets, then parishes, became depopulated almost overnight.

Gabriel's Gully, the neglected inland valley, was stampeded by thousands of ambitious men who lived in tents and paid for their flour and sausages with gold-dust. Queenstown, which grew up at this time on the shores of lovely Lake Wakatipu, was a shanty camp where every second building was an hotel.

Today, in outback Otago, there are deserted and crumbling sites of a dozen mining townships. Perhaps the traveller may find one old hermit, panning for gold in the lonely rivers, who can tell stories he has heard of the laughing, swearing, hard-drinking, godless men who passed this way in search of elusive fortune, and ultimately settled prosaically in Otago, earning their living, as most men do, perforce and not from choice, in the country or the town, and not in El Dorado.

The gold rush changed Otago's destiny: it doubled the population, so that the earliest settlers became merely the principal element in the direction of the province's course. Merchants were enriched, a handful of miners made fortunes and a reservoir of labour was provided for farms, roads and railways.

The new people threw up a new leader: Sir Julius Vogel, who founded and edited a daily paper to expound his ideas. For a number of years the principal force in New Zealand politics, he was the parliamentary pioneer of the Dominion's planned immigration scheme and of the extensive borrowing in crises which has made New Zealand the perpetual debtor of England.

A later Otago figure, Sir Joseph Ward, was twice Prime Minister and held Cabinet rank a number of times. He introduced several features associated ever since with New Zealand legislation—the first Public Health Department; insurance, superannuation and benevolent schemes for workers; and some measure of state control of banking and land affairs.

Otago Girls' High School, one of the first of its kind in the Empire, was endowed by the Presbyterian Church in 1871 and Otago University, the first College of the subsequent University of New Zealand, in 1877. For

Lake Gunn, in the Eglinton Valley, on the way to Milford Sound, Otago, seen against the background of the majestic bush-clad Southern Alps

over seventy years New Zealand education has been secular, but the watchful eye and financial benevolence of the Otago Presbyterians have given their state schools and college an enviable reputation for industry, scholarship and an unflinching moral worth, despite the materialistic popular philosophies of our day. In one respect at least, the blueprints of the pioneers have gone almost according to plan. At present Otago University is crammed with medical, dental, mining and engineering students studying, under an adequate rehabilitation bursary for ex-servicemen, subjects not provided in the syllabus of the other New Zealand colleges.

Otago's achievements in a wider sphere are principally scientific. Wisely and generously treated by the Presbyterian Church, by individuals and the state, Otago University is the eldest child of the University of New Zealand. It houses a medical school whose graduates are as well trained as those from much larger and older establishments.

Two doctors trained in Otago, Sir Maui Pomare and Te Rangi Hiroa (Sir Peter Buck) have achieved distinction in medicine and other spheres—Sir Maui Pomare, M.P., as Minister for Native Affairs, was a prominent figure in the recent revival of racial pride amongst the Maoris; and Sir Peter Buck, now Director of the Bishop Museum in Honolulu, as an anthropologist has contributed more than any other scholar to the written knowledge of the Polynesian people in the Pacific and New Zealand, particularly in his book *Vikings of the Sunrise.*

Early in this century Sir Truby King pioneered in Otago, with Dunedin backing, the research into infant feeding destined, as the Plunket system, to revolutionize the treatment of babies and to give the Dominion the lowest infant mortality rate in the world. Karitane nurses receive their distinctive name from the township where Sir Truby King lived, and whence, in time, his system was to extend over the rest of the Empire, to the United States, Scandinavia and the Netherlands.

Otago has profited, with the rest of the Dominion, from the government subsidy, introduced in 1945, of 10s. per week per child. In the last two years the birth-rate has risen sharply. Otago, more than any other province, has had an increase in population since the passing of the controversial land legislation empowering the government to

Numerous ski-ing resorts in the Southern Alps are readily accessible from Dunedin. A party of university students on the slopes of Mt Cook

purchase portions of large estates to provide farms for trained ex-servicemen.

A peculiarity about which Otago people are rather sensitive is the vast number of their prolific rabbits, which are decreasing the value of farmland with disheartening rapidity. Rabbiters employed by the government and private individuals are efficient to a point, but carefully leave breeding-patches so that future rabbiters shall not be deprived of a living. Sometimes the astonished observer will see an entire field (called "paddock" in New Zealand) apparently on the move; a closer examination reveals rabbits taking the night air. An enterprising Dunedin firm is capitalizing on Otago's curse by making "fur" coats for sale abroad.

Although Otago, except for the Falkland Islands, is the most southern of the inhabited British possessions, its climate is rarely bitter. Even in the highest levels of Central Otago sheep winter in the open, but they may occasionally have to be dug from snowdrifts. The lakes do not freeze over completely, though people are frequently able to skate on the ice at the edges. Curling tournaments are held regularly near Ranfurly, on a reservoir which is frozen over every year. Ski-ing parties book up months ahead to go to Coronet Peak (6000 feet) near Queenstown and to other resorts closer to Dunedin. Some years, in the coastal regions, there is no snow at all. North Islanders, visiting the far south in midsummer, complain that it is colder there than in the northern spring.

The fruit of the North Island is like that of Spain. Otago grows pears, apples, apricots, peaches and berries. The wheat of Canterbury and North Otago give way in South Otago (Southland) to barley and oats. At Invercargill and Gore, cereals are made into solid Scottish breakfast foods. An Irishman who visited Central Otago recently, later complained of having porridge for dinner every night.

Central Otago misses most of the province's rainfall; it is arid and yellow in mid-summer, but vast irrigation schemes are under way. There is plenty of water in Otago, badly distributed by nature. Rain falls over-abundantly on the fiords and unpopulated bush country of the west, and on the east, which leans without protection towards the dark, icy, distant polar seas; but Central Otago, after a winter of snow, may have a summer of temperatures soaring over 100° F. with never a drop of rain to temper the winds. This is still pioneer territory, where men ride hard by day and relax in the evening by the light of kerosene lamps used to illuminate their square wooden houses.

There is plenty of coal in New Zealand, but a certain amount of difficulty is experienced in persuading miners to bring it to the surface, so the Dominion is powered and lighted principally by hydro-electricity generated by the young rivers plunging down from the high country. Ambitious schemes to develop this power still further are constantly in operation. One such undertaking is the Waipori Station, near Dunedin, which has been expanding since its initial construction at the beginning of the century, until it now supplies most of the electricity for the city. The rest of Otago, and much of Canterbury, is supplied from Waitaki dam, on Otago's northern border.

Waipori shows many features typical of the best aspects of New Zealand electrification. The artificial lakes, here as throughout the Dominion, have been created to look as natural as possible. Trees have been planted down to the shores and in time the area will look almost like virgin bush. The lakes breed trout, so that altogether the district is an attractive home for the electrical workers and a source of delight to the city visitors who are encouraged there during their leisure hours. The workers are provided with shops and recreational facilities. Waipori is a credit to its owner, the amorphous State, from which, in New Zealand, there is no escape.

Otago attracts more than its proportionate share of overseas tourists, because Dunedin is the centre for trips to the southern lakes—Wakatipu, Te Anau, Wanaka and Hawea—across the rolling poplar-decked countryside. Milford Sound, almost at the bottom of the inhabited world, in its primal grandeur seems to many tourists to be alone worth a visit to New Zealand. The Milford Track, an inspiring bush walk to the Sound, has just been opened again after being forbidden to trampers during the war years, when it was neglected and dangerous.

The province's isolation is underscored by its consistent use as a base for exploration of the South Pole. Like all isolated communities, Otago has its particular habits and dangers. The inhabitants live in an intense world of their own, and are inclined to forget the more exacting standards of wider spheres. Cargo vessels occasionally connect the Bluff with Melbourne and Dunedin with South America, but contacts with the outside world are too rare and too brief.

From this remote, intensely British, serious-minded and forward-looking community, His Majesty the King, Queen Elizabeth and Princess Margaret will next year receive not the least heart-warming of their Dominion ovations.

Round about Glastonbury

Photographs by Desmond Laing, by arrangement with Clark Son and Morland L

The 18th-century Pump House of Glastonbury in Somerset. Once patients journeyed here from near and far, having heard of the miraculous healing powers of its waters ; but after an over-zealous young woman had consumed inordinate quantities and expired in great agony, traffic to the Spa soon dwindled and ceased

The 16th-century Glastonbury Tribunal, or Abbot's Court-house. Over the doorway are seen the arms of Henry VIII, whose association with the town was not a happy one : his commissioners accused worthy Abbot Whiting of stealing the Abbey treasures and had him hanged, drawn and quartered forthwith

Pilgrimmes' Inne, or George Hotel, which was built in the 15th century by Abbot Selwood for pilgrims attracted to the town where St Joseph of Arimathea was reputed to have deposited the Holy Grail, and where the bones of King Arthur and St Dunstan are said to have found their final resting-place

Doorway of Glastonbury's 12th-century Lady Chapel. After the Benedictine Abbey of St Mary, together with its churches, was burned in 1184, Henry II sponsored the work of rebuilding ; the Lady Chapel, started first, was completed and consecrated within three years. This Transitional Norman work is the town's oldest ruin

The Abbey Church, looking west. The story of Glastonbury was for hundreds of years closely interwoven with that of its famous Abbey ; here the Benedictine Rule, introduced by St Dunstan when he was Abbot, obtained from the 10th century to the 16th, in the first half of which the Abbey was finally suppressed by Henry VIII

Glastonbury Abbey Church, from the south-west. These are the remains of the building, completed after three and a half centuries, which succeeded a large Norman church, the 8th-century church of Saxon King Ina (both destroyed in the disastrous fire of 1184) and the original 1st-century wattle church. In 1559 the site of—

—the Abbey was granted to Sir Peter Carew by Elizabeth, remaining in private hands till transferred to the Church of England early in the 20th century. Besides the church and Lady Chapel, nothing of the monastic buildings is now standing but the Abbot's Kitchen, the undercroft of the refectory and part of the cloisters

The Almshouse Archway, Glastonbury, built during the reign of Henry VIII, whose arms it bears. Through it is seen the Almshouse Chapel, on which may be descried the arms of King Arthur—a cross with the Virgin and Child—inspired by a miraculous vision which appeared to him nearby, and later adopted by the Abbey

The Geography of Soaring

by JACQUES COCHEMÉ

In our January, 1946, number Mr Cochemé (formerly Squadron-Leader, A.F.C.) described the work of meteorological air reconnaissance on which he was engaged during the war. He is now doing research in soaring meteorology at the Imperial College of Science, and is a Silver C glider pilot

THE geography of soaring is the science of the reaction of the earth's surface to its climate inasmuch as it produces rising currents of air. Soaring, in fact, consists in gliding for as long and as far as possible in air that is going up faster than the sailplane is going down. It is varied and complex and a great deal remains to be learnt about it.

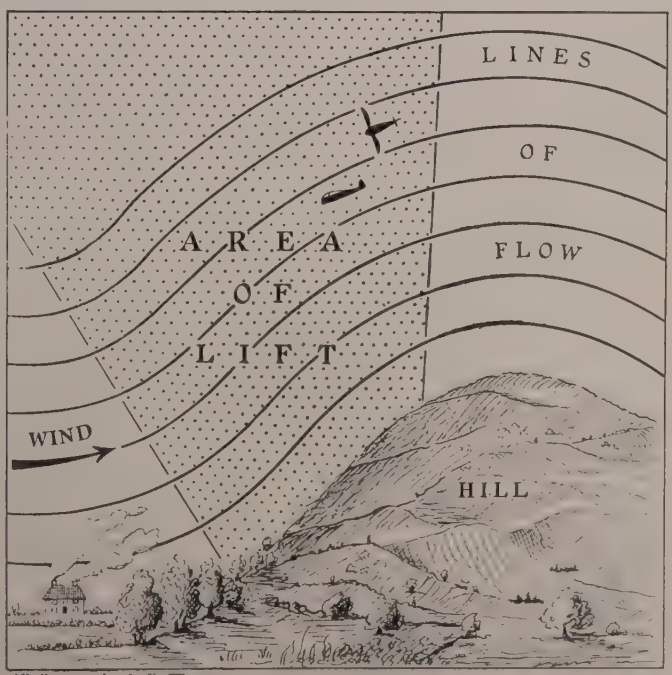
The simplest and most common form of soaring is hill soaring: the ascending current is produced by the upward deflection by high ground of the wind blowing across it. In this rising air the sailplane is borne at a maximum height which varies with the wind strength, the efficiency of the machine, and a few less obvious factors. Headed into the wind as much as is necessary to prevent it from being blown back over the ridge the sailplane edges, crablike, along the front. At the end of his beat, that is, when he finds himself running out of lift-generating hill, the pilot turns his glider round, away from the ridge, of course, and slides back the way he came. If the wind is sufficiently strong, the sailplane, its nose directly into it, remains stationary relative to the ground in front of the hill. Most people have seen gulls enjoying this pastime in a sea breeze at the edge of a cliff. At any week-end, or during the week for that matter, when the wind is blowing from the westerly quarter, hill soaring is bound to be going on along the Dunstable Downs at the north-eastern edge of the Chilterns. There sailplanes belonging to the London Gliding Club, or some of its members, will be seen pounding the Downs from the Dunstable end to the Whipsnade Zoo.

There are many interesting hill-soaring sites in England, facing its seasonal prevailing winds; and there are quite a few more as yet untried because of their remoteness or inaccessibility in Wales, Scotland and elsewhere.

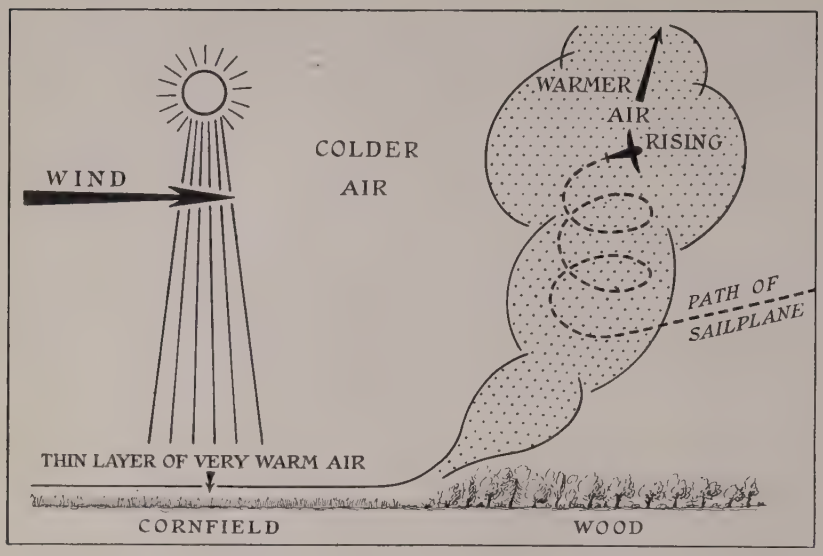
Long flights can be made along ranges of hills in a steady wind, or even that more skilful manœuvre, an out and return journey. The world's long-distance record of over 400 miles, set with fervour in Russia's vastness, might be beaten by crabbing rapidly in front of the Andes.

Air will also go up, irrespective of its horizontal motion, because it is warmer than the surrounding air and, consequently, lighter. The art of thermal soaring is to find such buoyant parcels of warm air and, by dint of assiduous circling, to keep flying within them and be borne aloft.

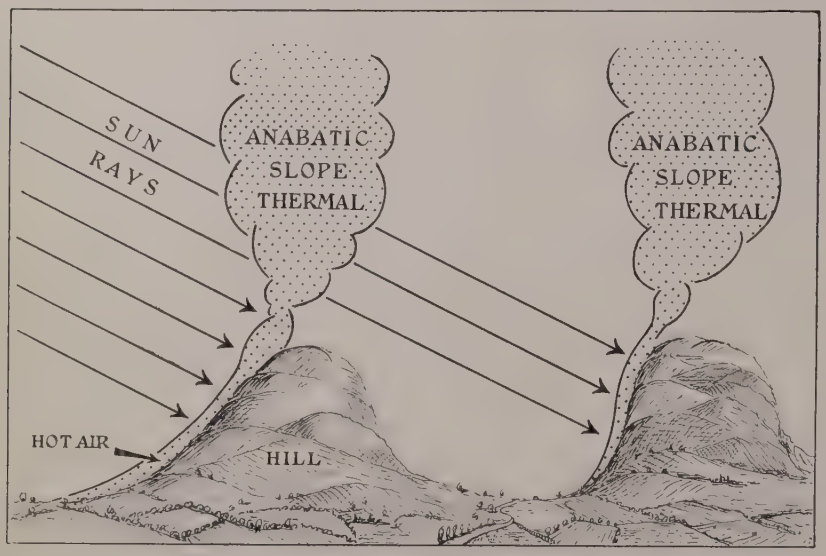
These differences in temperature arise in the first place because the rays of the sun do not warm the atmosphere directly. They warm the earth, which in its turn warms the air in contact with it, so that after a few hours



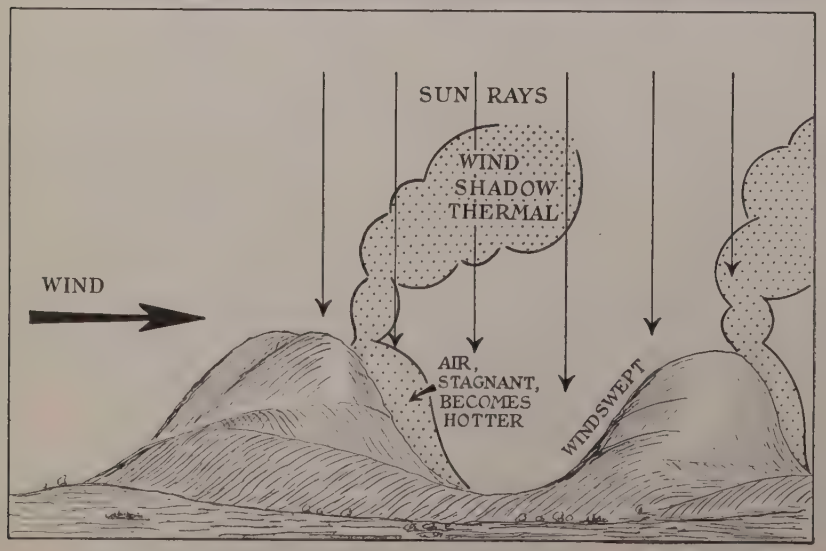
All diagrams by A. J. Thornton



The edge of a wood provides the trigger action which starts the thermal on its upward journey. As the sailplane enters it a tremor is felt and the variometer gives a positive indication. The pilot begins to circle in order to remain in the area of lift



Up the side of the valley that catches the sun, what is known as an anabatic slope thermal is formed and rises, breaking away at the top of the slope. In mountainous country this process and the evening cooling of the earth give rise to all sorts of local winds



On a cross-country flight a wind shadow thermal can give a providential new lease of buoyancy at a time when, the sailplane having reached the 'wrong' side of a slope, buoyancy is scarce. The art of soaring is to find sufficient thermals to keep the sailplane airborne

Charles E. Bro

The soaring slope of the London Gliding Club on the Dunstable Downs is only 250 feet high and a mile long, but it is well shaped to capture winds from the SSW. to the N. and give excellent lift in which many a glider pilot has found his wings. In sunny weather it is a good 'thermal-factory'

of sunshine the earth is covered with a pellicle of very warm air known as the super-adiabatic layer. Within this pellicle itself, differences in temperature will have arisen owing to differences in colour, texture, air and water content, etc., of the soil and in its vegetation. Because of these differences or, in a wind, because of the presence of obstacles such as the edge of a wood, a quarry, a range of hills, bubbles break away from this so-called super-adiabatic layer and begin to rise. They break away very much in the same manner as drops of water drip down from a leaky ceiling: the first drop tends to initiate a procession of other drops which find it easier to follow than to take an independent path. Thus a stream of rising air is generated, carrying free lift for the sailplanes. These bubbles, or thermals as they are called, may also be produced when air, which is cold because of the latitude of its origin, is moving over increasingly warm territory, as when the wind is blowing from the north, or passing from sea to land, or land to sea in a wintry north-easter.

The height to which the thermals will go depends on the distribution of temperature-with-height of the atmosphere through which they ascend. The stream of rising air itself

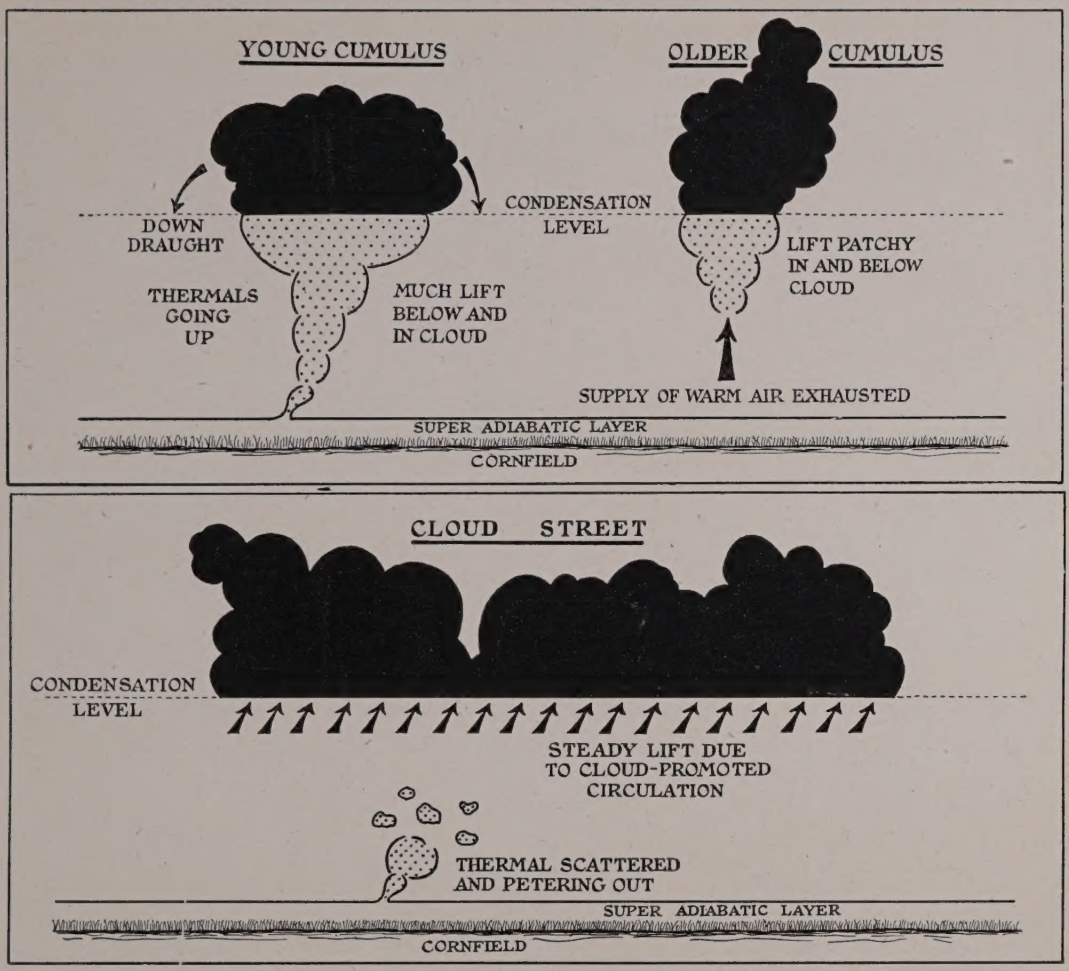
On the instrument panel of this Olympia sailplane there are two kinds of variometer (which indicate the rate of ascent or descent), an airspeed indicator, a sensitive altimeter, a turn-and-bank indicator (used for blind flying), and an accelerometer to record bumpiness. The ball on the left-hand top corner of the panel is pulled to release the glider from the towing cable. The curved lever on the left controls the airbrakes; the little knob on the seat jettisons the undercarriage. A small lever on the right trims the elevators; to the right of centre is the control column. The U-shaped handle seen over the instrument panel can be gripped by the pilot when he is tossed and shaken; above this rises the pitot tube, which transmits to the airspeed indicator the changes in air pressure caused by changes in the glider's speed

cques Cochemé

cools as it rises because it expands as the pressure decreases with height. This expansion consumes energy which is taken from the rising air in the form of heat. The rate of cooling by ascent, known as the adiabatic lapse rate, is 5.4° F. per 1000 feet in clear air. The thermal will go on rising as long as the difference of temperature between itself and its environment, which caused it to start floating up, is maintained.

As the thermal stream ascends, expands and cools, the amount of water vapour which it can contain decreases, and a point is reached when condensation to water droplets takes place and cloud appears in the form of cumulus. Fresh energy is liberated by this condensation and the thermal as it gives birth to a cloud accelerates upward. The distribution of temperature-with-height of the atmosphere can be measured by aircraft soundings or balloon-borne radiosondes. If it is such that it promotes thermal ascent it is said to be unstable and the soaring pilot looks forward to some sport.

As soon as the first rising air, or convection, clouds appear, thus testifying to the fact that thermals are rising, the pilot is launched and attempts to find one to stop his downward glide. He is helped by a most useful instrument called a variometer which tells him, almost at once, whether he is rising or falling relative to the ground. At low heights, yet not so low that forsaking all other pursuits he must concentrate on a safe landing, with an eye on the ground he uses his experience and local knowledge to select the spots over which he is most likely to find lift. As he gains height he turns his eye towards the sky and derives useful information from the clouds, under some of which air is still rising. Thus, by



During the days when thermal soaring is possible the greatly varied conditions met with are constantly changing. In his quest for lift, when the pilot seldom has more than a few minutes in hand, he may find large clouds with little to give or small ones which will take him up a long way

hopping from one cloud labelled "thermal" to another and circling within them, the sailplane remains airborne and, especially with the help of the wind, journeys are made.

The sailplane pilot who manages to remain airborne for five hours, gain 1 kilometer (3280 feet) in height and travel 50 kilometers (32 miles) is awarded a Silver C. There are about 150 British Silver C's.

Conditions are often similar, but never twice the same; vigorously promising thermals giving lift at, say, 10 feet per second will scatter their energy in diverging eddies and vanish in a thousand feet, whilst an initially sluggish current of one foot per second will gradually consolidate itself and grow into massive and even lift all the way up to cloud base.

Sometimes cumulus clouds arrange themselves in rows or 'streets' up- and down-wind and appear to start a circulation of air of their own, whereupon a long area of lift, parallel to the street, below it and to one side, is found. Along this area without any need for tedious circling one can press on downwind and go fast.

The uses of hill and thermal lift can, of course, be combined in a single flight. To soar in front of a hill is about the best place from which to wait for things to warm up and produce the thermal of the pilot's choice which will take him away from his earth-bound beat.

Sooner or later the sailplane pilot, reluctant to abandon good thermals, will want to fly in cloud. To fly blind in cloud he needs to trust and interpret the indication of instruments against the testimony of his befuddled sense of balance and his only too natural apprehension of the dazzling darkness. The task has been greatly simplified by the design

Th. Heimgartner

Soaring currents in Switzerland are a complex mixture of hill lift, wind shadow, and anabatic thermals, and sometimes also evening thermals and standing waves. Occasionally the impact of discordant powerful streams of air canalized by narrow gorges will itself give rise to useful lift

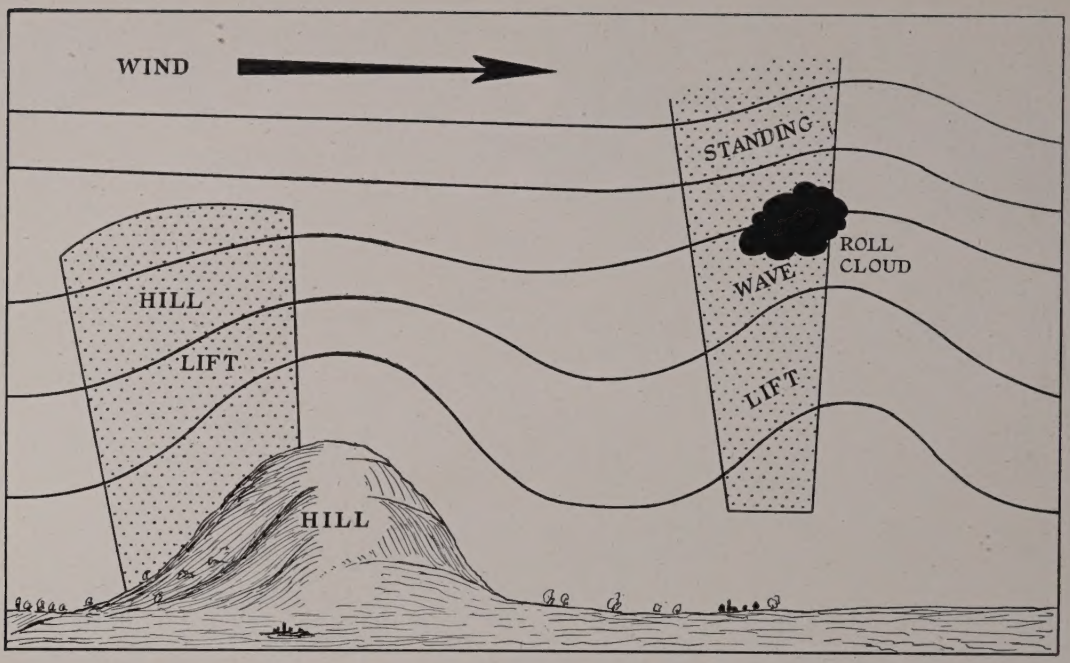
of sailplanes which are so beautifully balanced that they naturally keep, or return, to their equivalent of an even keel if they are not unduly bullied or nagged at. Given their head they will behave like a good horse without a grievance; but lack of confidence and rough handling will turn them into mad irresponsible things which scream as they dive out of control.

The ability to soar in cloud which, as I have explained, is mainly an achievement in mental discipline, leads to all sorts of exciting things: to great heights, for one. It is most uncommon in this country to rise much above 4000 feet without having to resort to cloud flying. In a shower-cloud (the towering cumulonimbus) there are strong vertical currents up to as much as 30,000 feet and of an average upward velocity of 20 m.p.h. Unfortunately these clouds carry the additional hazards of great turbulence and ice accretion.

Large shower-clouds may be grouped together in bands across the prevailing wind, moving with its velocity. These bands are called cold fronts. They bring about a change to colder and more unsettled weather and there is often, ahead of them, an area of strong lift which can be most useful. The sailplane pilot may succeed in gliding rapidly across the face of the front, increasing his speed until height is maintained but not gained, just below the base of the first curtain of clouds and ahead of the murky conditions in the rain belt, or he may choose to go with the front and perform arabesques ahead of it to remain in the area of lift. If he is daring he may succeed in penetrating the ebullient cloud mass and go high and far—if he does

Th. Heimgartner

A Swiss Moswey crossing the starting line at an international soaring competition held in Switzerland last July. It proved impossible to organize such a contest as part of the 1948 Olympic Games, though soaring was to have been included in the previous (war-cancelled) Olympiad of 1940



A standing wave (which is formed by wind bouncing up again in the lee of a hill and so providing lift) is often detected by the characteristic roll cloud, but can also take place in clear air; many an airline pilot has encountered bands of powerful lift on a crisp, clear winter's morning

not blunder into some violent down-draught and come down as fast as the hail in it.

A more recently discovered phenomenon promises even greater heights than the thunder cloud; and without its frightening cosmic display. It is the standing wave: with certain conditions of distribution of temperature-with-height and wind velocity the air lifted over an obstacle like a range of hill, after going down on the lee side, bounces up again. In fact, a series of waves is started of increasing height of crest and capable of lifting a glider much higher than it could soar ahead of the obstacle. In such a wave formed off the Alps a German glider pilot rose to 40,000 feet at the beginning of the war, a good deal more than the present world's record climb of 27,000 feet, done last year in a thunder-cloud in Scandinavia. Standing waves are often accompanied by typical standing roll clouds—clouds which remain stationary relative to the ground and indicate the crest of the waves. Perhaps the best known standing wave in this country is that associated with the Helm wind (the local name in Cumberland for an easterly wind crossing the Pennines at Scar Fell). It is even suspected that cold fronts can act as wave-forming obstacles and that the mother-of-pearl clouds, the highest clouds, 20 kilometres or more above the earth, well in the stratosphere, are the result of atmospheric waves. To soar in these one would need a glider with a pressurized cabin to enable the pilot to withstand the reduction of pressure at great heights. When Germany was overrun in 1945 such experimental gliders were found in the process of being built.

When a slope is exposed to the sun the heating along it will be almost even and consequently a thermal wind will blow up the slope. During the evening cooling of the earth the reverse process takes place. The combination of these air movements with small standing waves and ordinary hill lift, as well as with the interplay of waves of air of different viscosity, gives rise to an infinite variety of lifting currents in mountainous country. Soaring in these is fascinating and demands great skill. The Swiss are ahead in the development of that art but there are equally interesting though more modest mountain soaring sites in Scotland and Wales waiting to be recognized and used.

Thus, this quest for rising currents of air to keep one airborne in the most graceful of flying machines is endlessly varied. It demands a knowledge of the climates: of the weather, of its broad features and local idiosyncrasies; of the earth with its mountains, hills, and valleys, different soils, different growths; and of its little corners which produce famous lift for no known reasons.